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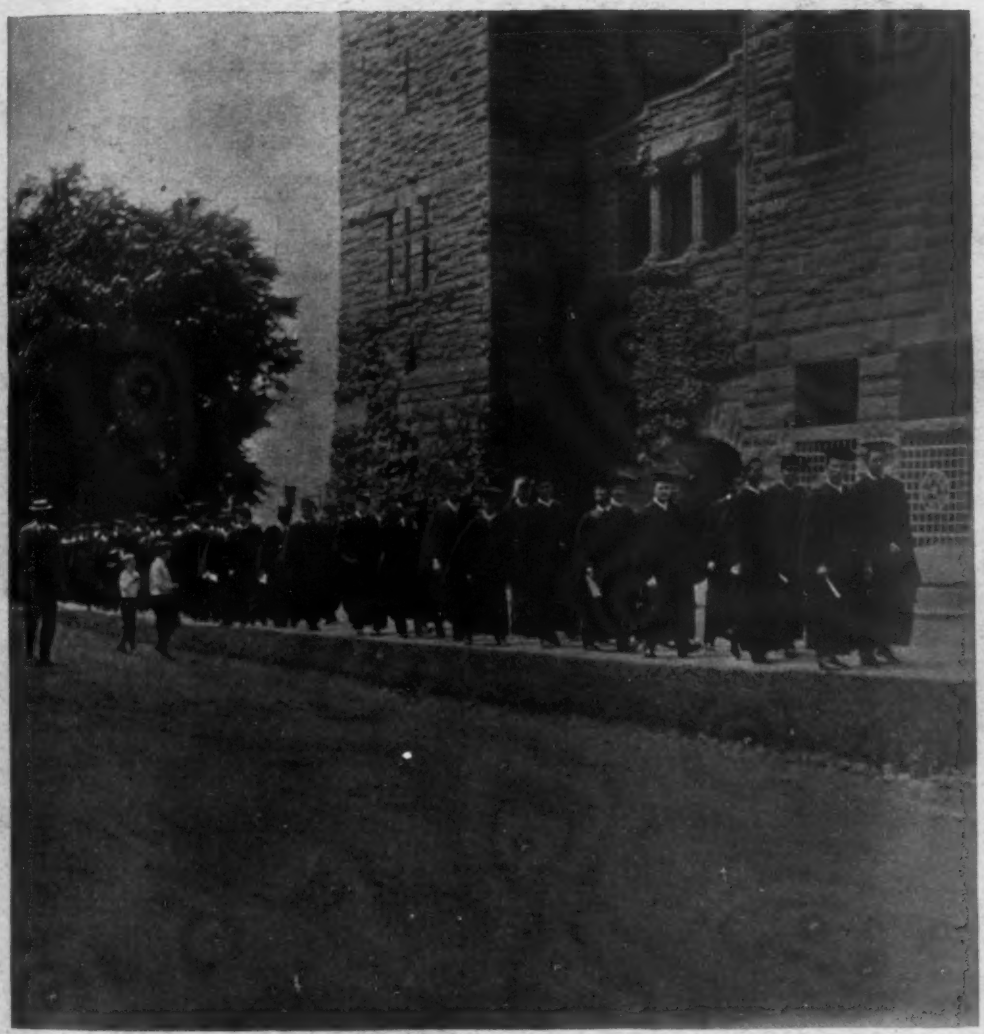
The Cornell Countryman



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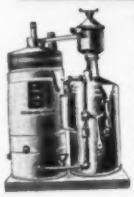

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NEW BUILDING OF THE COLLEGE OF AGRICULTURE; NORTH CAROLINA A. AND M. COLLEGE, RALEIGH, N. C.

THE CORNELL COUNTRYMAN

VOL. 3. JUNE, 1906 NO. 9

HOW CAN A COLLEGE OF AGRICULTURE KEEP CLOSE TO THE GROUND?

By L. H. Bailey.

THE evolution of agricultural education has been two-fold, —the working out of a system of pedagogy, and the development of means of aiding the farming people directly in the problems of their business. In this evolution the trend has always been towards the soil rather than away from it, although this has not always been recognized since an educational system does not and cannot follow a farming system. Farming is one thing; education in terms of farming is quite another thing. However, the farm and the college are coming closer together, both because the college is finding ways of using agricultural practices in teaching, and because the farmer is coming to a better understanding of what education is. The colleges are losing their apologetic attitude, and are accepting agriculture and country life frankly.

There are many great special movements that are now taking the colleges of agriculture directly to the farm, chiefly in that field conveniently known as extension work; but more is yet to be done. It was an old idea that the college was sufficient unto itself, having its own farm, developing its own farm practice, and holding to its own point of view. In fact, the old farm itself was dominated by a similar spirit,—it raised its own products for food and clothing, depended on itself rather than on neighbors or market or society, developing a kind of personal feudalism.

At present, I have no mind to discuss the inter-relations of the college and the farm, but only to mention certain ways in which the regular academic teaching may be kept close to the ground, by which I mean in close touch with good farm practice and in sympathy with the farmer's point of view, for the good of both the student and the farmer. These means are clearly in the nature of an intimate interchange of ideas and experience, resulting in friendships in the broadest sense. They fall into two classes,—those in which the student goes to the farmer, and those in which the farmer comes to the student. This touch of the student with the farm and the farmer should be continuous throughout his college course, and should come naturally and never be forced. It will be noticed that I speak always of the student and not of the teacher. The student should get his touch with these questions himself, as a part of his own personal experience, in the same spirit in which he now comes in touch with his formal subject-matter through his laboratory work.

I look on the "County work" recently inaugurated by the students in this College as one of the means of acquiring this personal experience of farm men and farm affairs. It is good for the farm boy or girl as well as for the city boy or girl, because it broadens experience and keeps the sympathies alive. It should not be confined to one laboratory, that is, not to Tompkins County alone; and I look for the time when something will de-develop out of it for the entire state. This work, however, must be very carefully supervised. There is great danger that it may not only fall short of its purpose but may do positive

harm if not managed with unusual care and good judgment. It must never have in it anything of the doctrinaire.

I have felt that a system of student correspondence with farm youth may sometime develop in such a way as to be advantageous to the cause.

There are two special ways, however, that I wish now to emphasize. One concerns the way in which the student may secure farm practice, and the other the way in which he may secure farm advice.

It is an old question as to how far a college of Agriculture can supply farm practice. The mere physical difficulties of supplying it to a large body of students are insurmountable. At best, a college farm is not a commercial actual farm. It is not surrounded by normal farm conditions. Therefore its farm practice may or may not be the farm practice of farmers' farms. It is not the sphere of a college of agriculture to engage in farming, but to teach. If it merely ran a farm it would not be a college. Yet every college must have its farm, and I think that all these colleges can make more use of their farms as teaching agents than they have been able to do thus far. One must carefully distinguish, also, between the grades of instruction that it is proposed to develop,—whether it is of training-school grade, preparatory-school grade, college grade, or university grade. The more advanced the grade of instruction, the deeper does the student go into fundamental questions and the greater are the facilities and opportunities at his disposal; and the less can he afford the time for acquiring skill in mere hand practice. As a matter of money economy, also, it is cheaper to acquire the hand practice when not in college. The fact is, that the student should have his farm experience before he comes to college; or if he has not had that privilege, he should secure it on a farmer's farm sometime during his college course.

Now, I look on the good farms of New York State as laboratories for the College of Agriculture. I have long had in mind the making of a list of the best farms to which students desiring to learn advanced farm practice can be recommended. These farms should be classified as to their kind,—dairy farms, fruit farms, poultry farms vegetable-garden farms, floricultural farm, and the like. No farm should be entered on the lists till it has been inspected and approved as to its general prosperity, sanitary conditions and moral surroundings. Students should be sent to these farms as students, that is, to learn; if they render the farmer service they should be paid by him just what the service is worth. When we enter the new building, I hope that we may begin this "book of life." All this would not in the least relieve the College of the responsibility of maintaining farm-practice and of extending it; but it should be the means of supplementing the work of the institution and of bringing the people and the College still closer together.

The other special matter that I have now in mind is the providing of means whereby the students can have the advantage of advice by farmers. It is an excellent plan to have lectures by experienced men now and then, but this is not sufficient. This past winter we began the practice of asking farmers to visit us for some days at a time in order that they might inspect our work leisurely, offer such suggestions as occur to them, and be in readiness to consult informally with students. I should like an office room that can be given over wholly to such visitors; and I should like to have it occupied throughout the college year, different farmers coming for, say, a week at a time. These farmers would represent, in the course of the year, the many kinds of farming in the state. The students could always drop in, at certain hours, for counsel. This arrangement would be of mutual advantage to the College and the visitor. The College should contribute the expenses.

AGRICULTURAL EDUCATION IN THE MIDDLE SOUTH

By C. W. Burkett,

I am requested by the editor of the *Cornell Countryman* to say a few words in reference to agricultural education and its development in Virginia, North Carolina and South Carolina. These three agricultural states have recently awakened to great agricultural possibilities, and are manifesting in every way a decided interest in this, the most important phase of national education. One of the most striking features of this development has been the material equipment that has accumulated for the purpose of agricultural instruction in Virginia, North and South Carolina. And it is well to bear in mind that the first essential in developing agricultural education is to have the means and the equipment for instruction in agriculture. One cannot farm without land, teams and tools. On the other hand one can study Latin or Greek under an apple tree.

Evidence that this idea is correct is seen in the fact that five years ago none of these institutions had either equipment or agricultural students. Today, more than five hundred agricultural students are enrolled in the agricultural courses of these three institutions. Five years ago the graduating class of these three institutions showed no more than one agricultural student to twenty-five in other lines. Today the number has been changed to the proportion of about one in four. This year from these three institutions forty agricultural students will be graduated.

Not only has there been a growing interest among the young men that are in these colleges in favor of agricultural education, but the sentiment in favor of agricultural education is changing in a marked way in all of the states, to the end that our people realize that in order to reclaim and improve our soils, and make them truly prosperous, agricultural development all along the line is necessary; and that this can be brought about only through equipping the agricultural colleges to the end that trained men may be turned out, to go back to the farms as leaders of the people. That this is so, is evidenced by the fact that these three states now have agricultural buildings, which in value and extent surpass those devoted to other lines of education in the A. & M. Colleges. In every case these buildings are fitting monuments to agriculture, and representative of the dignity and esteem in which agriculture is held. When we remember that five years ago not one of these colleges, in fact in not one college in the South, was there a good agricultural building connected with the college, and that the equipment consisted generally of a broken down farm, and a few old outbuildings with no livestock, it seems to me that all friends of agricultural education have reason to feel encouraged and to feel that the South, in proportion to her wealth, is coming to the assistance of her agricultural colleges in a most liberal way indeed. As soon as we can turn out enough men to make an impress on the agricultural communities, and to supply the growing demand for managers of orchards, gardens, stock farms, and dairies; and to let the people see the value of agricultural training, the future of the agricultural college in the Middle South is assured and agricultural education will go forward by leaps and bounds.

While I do not have the figures at hand I am inclined to believe that the graduating classes in agriculture in Virginia, North Carolina and South Carolina of this year and of last year contain more agricultural men that all of the previous years from the time the agricultural colleges were first established until two years ago.

This change of feeling has been brought about by a change of point of view. As errors are cleared away, as necessary equipment is provided, and as time demonstrates correct princi-

ples, so we may expect that another decade will show no more prosperous agricultural colleges, no more agricultural students than found in the agricultural colleges of the Middle South.

Another evidence of this change of feeling toward agricultural education is the fact that it has been the experience of every professor of Agriculture a few years ago that it was generally impossible to get newspapers to publish an article relating to agricultural education, the agricultural college, or to the agricultural experiment station, and when done it was only as a great accommodation. There has been a wonderful change in public sentiment in this respect. Today even the daily papers are after these institutions continually for practical articles about the relation of agricultural education and agricultural improvement to general state conditions.

Another phase that is being gradually changed—I would emphasize this point also—is that men in the southern agricultural colleges are simply worked to their utmost capacity, calling into action absolutely all of the nervous force they can command; working in a great many directions entirely beyond their capacity and possibilities; and this for the simple reason that specialization is not possible because of the scarcity of teachers and funds. But this condition of affairs is being bettered gradually and those responsible for this agricultural awakening are filled with hope and faith in their work and even now are being rewarded by many proofs of appreciation and by the many answers to their calls. A rather marked measure of this agricultural work has been the method of not only bringing together young farmers to the college, but old ones as well; for it has been the custom each year to have a State Farmers' Convention or Institute;—a week during the summer months when the buildings and dormitories are turned over to farmers, and the time devoted to a discussion of agricultural principles, practices and farm problems. I presume in all, that more than two thousand farmers are in attendance during these three annual conventions held at the agricultural colleges.

But more than this is being done. Agricultural education has been carried to the rural school; and I do not hesitate to say that more children are being taught agriculture today in schools in the South and in a more systematic way and with more enthusiasm as a whole than anywhere else in the country. Teachers have not only endeavored to teach agriculture in a pedagogic form in their schools, but they have endeavored to train themselves as well to do this work in a systematic and correct way. In North Carolina for instance, I think I am altogether safe in saying that as many as one-third of our teachers in the rural schools have received instruction in agriculture either at a teachers' institute, a County Summer School, or a State Summer School; for it is the rule that agriculture shall be taught in each of these teachers' meetings sometime during the year. The accumulative effect of this plan is going to be manifest within a few years, for the consoldiated school has already come in many counties, and is growing in favor constantly. It has been the agricultural college that has been back of the movement; it has been the work of the State officers, the county officers and of the teachers to make this work a success, because they have felt the need and they see the necessity and value of the new school education and are doing their share in affecting the change and the evolution.

All in all then, there is nothing but a very bright future indeed before agricultural education and the agricultural college of the Middle South. The delightful climate, the wonderful agricultural possibilities, and splendid environments unite in making the future of all agricultural colleges of the Middle South pregnant with tremendous possibilities and magnificent opportunities.

RURAL ECONOMY

By G. N. Lauman.,
Assistant Professor of Rural Economy, Cornell University

THE term rural economy is found in few modern dictionaries and is little known and less understood even among those who follow closely the developments of agriculture. The English use the term somewhat as equivalent to agriculture and some English universities have a professor of rural economy whose lectures seem to be in the main along the lines we now call agronomy. Beyond agronomy, animal husbandry, horticulture and all other distinctly technical branches of agriculture there are those relations of the farmer to his neighbors, the community and the world in general which are beginning to be considered of equal importance to the purely technical problems which confront him. When the farm was a self-sufficient entity and in the days of the pioneer and settler the question uppermost was one of wrestling with nature and wrestling with man or even seeking the co-operation of neighbors for common good was not much in evidence. This is the history of man wherever found. He does not feel the necessity of interesting himslf in questions beyond his immediate horizon until surrounded by others striving in the same way when common questions need to be solved from the standpoint of the community, state, nation or nations. Such questions in all communities, whether urban or rural, may be either social or economic, to adopt the common classification. Rural economy may be tentatively outlined as that field of knowledge dealing with the facts deductions and theories concerning the economic side of agriculture, particularly such as concern more than the individual farm unit and group. It is, therefore, scarcely a question of individual farm management . This distinction should be clearly kept in mind for in the limited development of the study in the United States may be seen the confusion caused by the lack of distinction between individual economy of the individual unit on the one hand and the economy of the aggregate units or masses of varying numbers. Managing a shop whether for the sale of groceries or the manufacture of binders is not the content of economics, neither is farm management rural economy.

Among the tentative general divisions of the subject which have in varying degrees of intensity been the object of much study in the older countries, particularly of western Europe, is that dealing with the relations of the state to agriculture. These have assumed serious aspects for example in Germany where an agrarian past is struggling with an industrial present. In many of its aspects this question comes to every nation presenting itself as an internal question or a foreign question, or both. The rise or fall of particular crops and with these the welfare of larger or smaller areas is often intimately associated with such struggles and such questions cannot be intelligently solved without a knowledge of the fundamental technical principles of agriculture.

The question of the department of learning in which such studies are to be made is thus raised. Perhaps without conscious direction rural economy finds itself in the United States in two faculties or departments of agriculture and economics. In some European schools it is found in its varied aspects in both departments, while in others either agriculture or economics provides for it. The late Professor von der Goltz, of Bonn, was the head of the Agricultural Academy of the University, whose lectures and writings on agrarian problems had more than national influence. On the other hand there have been issued from the Staatswissenschaftlichen Seminar of Professor Conrad at Halle a|S a number of valuable monographs on agri-

cultural development, in addition to his own studies in this field. As stated above, this condition of division obtains in the United States and at present it seems that the colleges or departments of agriculture are to develop rural economy rather than departments of economy. Perhaps this is due to the historical apathy of departments of economy to the fundamental economic development of the United States, that is along agricultural lines, and secondly to the great expansion of agricultural colleges and departments all over the country.

It is fortunate for rural economy that it had its origin in the civilization of Europe rather than that of America. It was a part of the agriculture of the Kameralwissenschaften in the days when there was no real economy and almost all economy was necessarily rural economy. Among the works on the fundamentals of political economy is v. Thuner's Isolirter Staat, based on agriculture from beginning to the end. Foreign economic journals are scarcely ever without articles on the economic side of agriculture and yet the greatest of agricultural countries has not had until lately any genuine students of its past and present agricultural conditions to guide it in the future with the increasing struggle for existence.

Aside from those problems of agriculture which call for governmental aid in their solution there are the many questions which depend for their solution on the enlightened opinion and action of the rural community. Among these perhaps the most pressing are the development of co-operation and the adjustment of the labor problem or of agriculture to the labor problem. In the former field spasmodic effort and some progress have been made, while the latter field has not yet been touched. What is needed is a general knowledge of the fundamentals of these problems, their evolution and attempted solution in other countries, studied and solutions attempted or offered in terms of agricultural conditions and not in terms of the so-called urban economy. It is necessary to recognize that there are two dictinct fields of production, that of the factory and that of the farm, each with its own distinctive fundamentals. The former is much more amenable to man's wishes and the latter has an intimate and inseparable connection with nature.

The agricultural departments of the colleges and universities of the United States are training each year more and more men and women who go back to the farms. It is one of the aims of rural economy to give these leaders of agriculture such facts and theories as are necessary to an enlightened sympathy with the economic problems of agriculture and to furnish a solid basis for the logical development of an agrarian policy, in harmony with the conditions of nature under which agriculture must be conducted, benefiting the whole community, state and nation.

THE MANUFACTURE OF CONDENSED MILK. V.

By O. F. Hunziker.

CONDENSING.

From the well room the boiled and sweetened milk is drawn into the vacuum pan (Fig. 1) which is usually located on the second floor directly over the well room. Here the actual condensing of the milk takes place. The vacuum pan is a retort in which the milk is evaporated under reduced pressure. Just why the retort used for condensing milk is known in the Condensed Milk industry as the "Pan" has not been satisfactorily explained. Probably the name originated from the fact that in the early and experimental days of the manufacture of condensed milk the milk was evaporated in open kettles called "Pans."

The vacuum pan is made of copper throughout. It consists of four main parts: Part I, the jacket or bottom; part II, the body; part III, the dome or upper part, and part IV, the condensor. These retorts are made of various sizes and shapes. Most condensories have adopted the so-called "six-foot-pan" with the shape similar to that of Fig. 1. By the term, "six-foot-pan," is meant a pan measuring six feet in diameter. Part I is com-

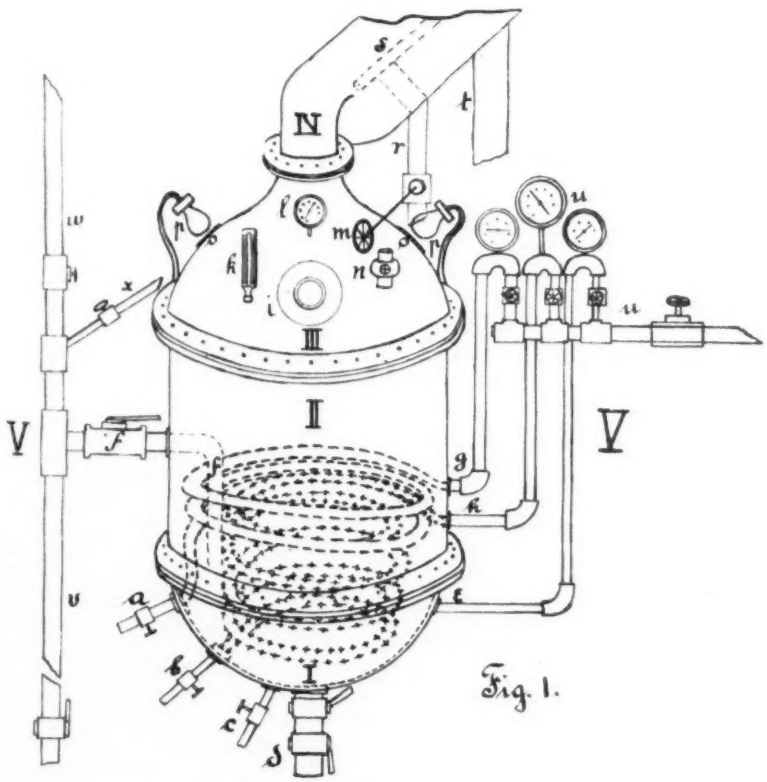


Fig. 1.

I JACKET—a. Steam outlet of large coil. b. Steam outlet of small coil. c. Steam outlet of jacket. d. Outlet of finished condensed milk. e. Steam inlet of jacket. II BODY—f. Milk inlet. g. Steam inlet of large coil. h. Steam inlet of small coil. III DOME—i. Manhole cover with eyeglass. k. Thermometer. l. Vacuum gauge. m. Valve for water inlet of condensor. n. Blow-down valve. o. Eyeglasses. p. Electric lights. IV CONDENSER—r. Water pipe leading to spraypipe. s. Spraypipe. t. Water outlet connecting vacuum pump. V ACCESSORIES.—u. Steam supply and gauges for jacket and coils. v. Milk supply. w. Water. x. Steam.

pletely surrounded by a steam jacket and has, in the center of the bottom, an outlet for the finished condensed milk. Part II is equipped with copper coils which extend downward into the jacket. Most six-foot pans are fitted out with two coils, though there are some pans in use that have three coils. The coils vary somewhat in size, the larger and upper coil measuring from 4 to 5 inches, the smaller and lower coil 3 inches in diameter. The jacket and coils are connected separately with the main steam line and are the means of heating the milk. The total heating surface of a six-foot pan covers about 110 to 120 square feet and such a pan will condense from 15,000 to 20,000 pounds of milk in one batch.

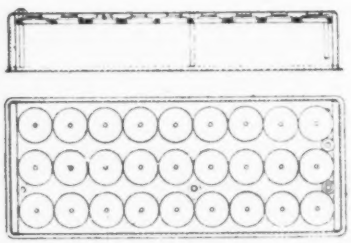


FIG. 2—COOLING TANK
Courtesy Jas. Baizley, Iron Works

The man-hole in part III is made large enough (15 to 18 inches in diameter) to allow the pan-washer to enter the pan. This opening is closed with a well fitting, heavy brace cover, carrying in its center an eyeglass through which the processor watches the boiling milk in the pan. In the rear of the dome there are two more eyeglasses. Through these the interior of the pan is illuminated either with lamps, gas, or electric lights. The thermometer which perforates the dome has a long stem enclosed in a brass casing, and reaches down into the milk. Some processors prefer a short thermometer which registers the temperature of the air instead of that of the milk in the pan. The vacuum gauge is in connection with the interior of the retort, and indicates the number of inches of vacuum. The blow-down valve serves to break the vacuum which is sometimes necessary in case of accident and must always be done when the condensing is completed, in order to facilitate the drawing off of the finished condensed milk.

Part IV, the condensor, consists of a huge, hollow, copper cylinder, usually but not always, in horizontal position. In its interior there is a spray pipe—a large copper pipe perforated with innumerable holes. The spray pipe is connected with the water inlet of the condensor, and, when the pan is in operation, a shower of water issues forth from these holes in all directions, owing to the reduced pressure in the condensor. This spray of cold water condenses the vapors arising from the heated and violently boiling milk in the pan. The condensation water together with the water from the spray pipe is carried off through the pipe that connects the condensor with the vacuum pump. In the manufacture of condensed milk wet vacuum pumps are now used exclusively.

Before introducing the milk the pan should be thoroughly rinsed with water, then steamed till the temperature rises to about 180 deg. F. This should be done in order to prevent the sudden chilling of the hot milk when it enters the pan. Then the man-hole cover is inserted, the vacuum pump started, and the water valve partly opened allowing some water to run into the condensor. When the vacuum gauge shows 26 to 27 inches of vacuum the pan is ready for the milk. The milk valve is now opened and the milk rushes into the pan because of the partial vacuum in the retort. Steam is turned into the jacket and coils as soon as they become covered with the milk. When the upper coil is completely covered with milk the milk valve is partly closed and the milk inflow so regulated that the boiling liquid is held as nearly as possible at a constant level. In other words, the milk is drawn into the pan continuously, and only as fast as it condences. When all the milk of one batch, say

15,000 pounds, is in the retort the evaporation is nearly completed.

The steam pressure used in the jacket and coils varies from 10 to 25 pounds; it should be governed according to the temperature and the water supply in the condensor. The use of less than 15 pounds of steam retards the condensing, while an excess of steam pressure above 25 pounds tends to injure the quality of the condensed milk. The temperature is governed by the amount of steam in jacket and coils, the amount and temperature of the water in the condensor and the completeness of the vacuum. The milk is condensed at temperatures ranging from 120 to 150 deg. F. Other things being equal, the more steam, the higher the temperature of the milk; the more spray water in the condensor, and the more nearly perfect the vacuum, the lower the temperature. A slight air leak in the retort will reduce the vacuum and cause a rise in the temperature.

The time required to condense a batch of 15,000 pounds of milk at a temperature of 130 deg. F., with about 25 pounds of steam pressure and in a 25 inch vacuum is from 2½ to 3 hours. The more steam and the more water used, the temperature being the same, the more rapid the condensing. The process should not be hastened, however, to the extent of using more than 25 pounds of steam pressure. Aside from the capacity of the vacuum pump and the presence or absence of leaks in the pan, the vacuum is governed largely by the temperature. A rise in the temperature is followed by a fall in the vacuum and vice-versa, and a decrease of the vacuum means less rapid condensation. Therefore, the higher the temperature, above a certain limit, say 130 deg. F., the slower will be the evaporation. The more evenly the pan is operated, the fewer and the less abrupt the changes in steam pressure and in temperature, the shorter will be the process of condensing and the better will be the quality of the condensed milk.

When all the milk is in the pan the steam pressure should be gradually reduced so that the batch can be finished with not more than about 5 pounds of steam. The reasons for this precaution are manifold: when the inflow of fresh milk stops, the contents of the pan thicken rapidly and the boiling becomes less violent. If the heating surface is too hot the syrupy milk is liable to stick to and burn onto the jacket and coils; too high steam pressure at the end of the process tends to cause the milk to thicken after it is put into tin cans; again, a reduction of the steam pressure will lower the temperature of the condensed milk so that the change of temperature when the condensed milk is subsequently cooled is less abrupt.

In some factories a somewhat different process is applied. The milk is condensed with a view of swelling it in order to increase the yield of condensed milk. The heated milk is drawn into the pan without first adding the sugar. When it has nearly reached the proper degree of condensation, all the valves are closed and the vacuum pump stopped. Live steam is then turned directly into the condensed milk until the temperature rises to 180 deg. F. and the vacuum has fallen to about 12 inches. Now the vacuum pump is again started and the process continued and finished in the usual way.

FINISHING OR "STRIKING."

The "striking" of a batch of milk is the term used to express the operations incident to the sampling of the condensed milk and completing of the condensation. To know just when the proper degree of condensation has been reached is the most difficult part of the entire process. It is here where the processor can easily make or lose his wages. There are various conditions that show the processor when the milk in the retort is nearly "done"; viz., the time required for the evaporation, the number of minutes elapsed since all the milk has been drawn up, the amount of condensed milk left in the pan and most of all, the appearance

and behavior of the boiling milk itself. Milk that has been sufficiently condensed assumes a glossy and glistening lustre, it boils over from the circumference towards the center, forming a small nucleus of foam in the center of the pan. If the pan-man be a careful observer he is able to tell within a few seconds when the batch is done just by looking into the pan. This does not mean, however, that he should wait to the last minute till he "strikes" or samples the milk, for even the most skillful and experienced processors are easily deceived by the mere appearance of the milk through the eyeglass. Samples can be drawn from the pan by operating the two valves at the outlet, (see Fig. 1). While the pan is in operation the reduced pressure in the retort would make the drawing out, by simply opening the outlet, impossible. Instead of the milk running out the air would rush in with violent force and would cause the milk in the pan to be thrown over into the condensor. For this reason the outlet is equipped with two valves. The lower one is closed and the upper one opened allowing some milk to run down into the nipple between the two valves. Now the upper valve is closed and the lower one opened and the milk in the nipple can run out freely. The first sample should be rejected and the operation repeated. The second sample is caught in a dipper or cup where it is examined. Many methods have been invented and apparatus devised with the endeavor to determine accurately the point of the desired density of the samples thus obtained, but, so far, none of the devices tried have given as good satisfaction as the experienced eye and good judgment of the processor. Attempts have been made to determine the density of the sample by means of resistance-meters, specially prepared hydrometers, or by weighing a definite quantity of the condensed milk on sensitive scales. All of these methods proved inaccurate and unsatisfactory and have, therefore, been abandoned. The principle objection in every case was, that they operated too slowly. When the milk has been condensed to a point where one minute more or less means the success or failure of a batch there is not time to fill a cylinder and wait until the hydrometer has adjusted itself in the syrupy solution nor to measure out a definite quantity and wait for the scales to find their equilibrium. Again, a change in the temperature, a difference in the percent of fat, or a mistake in the amount of sugar added would so change the specific gravity of the condensed milk that these devices would naturally give misleading results. A decided improvement over the above methods is the following: The sample is drawn into a dipper; the dipper, containing the sample, is lowered into a pail containing ice water and, with a metal back thermometer, the contents of the dipper are stirred rapidly till a constant temperature, say 70 deg. F., has been reached and the viscocity and resistance of the cooled condensed milk will tell the processor whether the milk is condensed enough. While this method is far in advance of the above described ones and while it is used today in many factories, its objection is that it occupies too much time. The best results are obtained by finishing the batch at a constant temperature, taking a sample into a cup and, with the aid of a teaspoon judging its consistency at that temperature. With a little practice, a quick eye and good judgment the processor soon becomes efficient in the operation of "striking," and is able to make a condensed milk of very uniform density from day to day.

When the evaporation is completed the steam is shut off from the jacket and the coils, the water valve is closed, the vacuum pump stopped and the vacuum broken by opening the blow-down valve in the dome. As soon as the man-hole cover is removed the vacuum pump is started again for the purpose of removing the hot air from the pan which is liable to cause the milk to crust over while it is being drawn off. The milk is drawn into 40-quart cans which are subsequently

set into the cooling tanks. The condensed milk should be removed from the pan as rapidly as possible in order to prevent its superheating while lying idle in the hot retort. In some factories a wire mesh or cloth strainer is attached to the outlet of the pan and the milk strained before it runs into the cooling cans. This practice is unnecessary and objectionable as it tends to retard the removal of the milk from the pan.

COOLING.

When the finished condesed milk leaves the vacuum pan its temperature stands above 100 deg. F., generally 115 deg. to 120 deg. F. If it were not cooled at once it would become thick and cheesy in texture in a short time. In the early days of the manufacture of condensed milk the hot con-

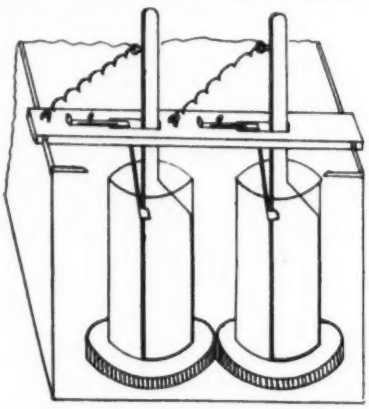


FIG. 3—COOLING CANS WITH PADDLES

densed milk, drawn into milk cans (40-quart cans), was set in cold water or ice water and stirred with a stick or paddle by hand. This was very hard and tedious work, increasing the cost of production and, the stirring being imperfect and irregular, the quality of the condensed milk was far from being perfect. It was soon observed that imperfect stirring caused some of the sugar to recrystallize and make the milk sandy. The sudden chilling of a saturated sugar solution like sweetened condensed milk is favorable to the formation of sugar crystals. Where the stirring is imperfect all of the milk is not kept in sufficient motion to insure uniform and gradual cooling. The milk bordering the sides of the can is exposed to such an abrupt change of temperature that the formation of crystals is almost inevitable.

Gradually the method of cooling was improved and the hand stirring has been completely abandoned. Paddles closely scraping the sides of the cans are now used. Instead of setting the paddles in motion they are made stationary and the cans filled with condensed milk revolve. The principle is similar to that adopted in the ice cream freezer. Heavy iron tanks with a capacity of from 12 to 48 cooling cans are used for this purpose. The bottom of these tanks is equipped with a system of cog wheels set in motion by means of a gear at one end of the tank, (Fig. 2). The wheels are little larger in diameter than the cooling cans and are so cast as to allow the cans to rest in a rim or flange which prevents them from sliding out of position. The cooling cans are either ordinary 40-quart milk cans or cylindrical cans made especially for this purpose. The main point is that they are made out of heavy material. They should be substantial enough to stand rough usage without suffering indentations. Cans with irregular, uneven, depressed or bulged sides will not make a thorough scraping of the sides by the paddle possible. Such cans should be slipped over a wooden horn and the indentations hammered out with a mallet. The paddles are forced against the periphery of the cans and held stationary by the cross bars and springs. See Fig. 3.

It has been stated above that sudden changes of temperature are conducive to the formation of sugar crystals, which rob the sweetened condensed milk of the desired smoothness and, which, later, will settle to the bottom of the sealed cans. This is a very common defect and settled milk is usually rejected on the market. For this reason it is necessary to cool the sweetened milk gradually, uniformly and slowly. This is

best accomplished by warming the water in the cooling tank to about 90 deg. F. before the cans are lowered into it. Then let the cans revolve for about 20 minutes without the addition of cold water. After that cold water may be run into the tank little by little till the temperature of the milk has fallen to 70 deg. F. The entire time for cooling should occupy at least two hours. In some factories the milk is cooled in 40 minutes and, if the water is not cold enough to accomplish it in that time ice is added. These factories invariably put on the market a sandy and settled milk. Naturally the time necessary for cooling will vary according to the temperature at which the milk is finished in the pan. Where the evaporation is completed at a very low temperature the time for cooling can be reduced accordingly. It must be remembered, however, that to finish a batch of milk at a low temperature means a corresponding increase in the time necessary to condense; therefore, the gain of time in one part of the process is generally offset by a corresponding loss of time in another. The lower the natural temperature of the water used for cooling, the greater the danger of the milk becoming sandy. Too much attention cannot be paid to this very essential but generally overlooked fact. When the milk is sufficiently cooled the cans are stopped, the paddles taken out and the cans removed from the tank.

Attempts have been made to improve the above methods of cooling, but without success. It seemed plausible that the finished condensed milk might be cooled in the vacuum pan before drawing it out, by turning the steam off and running cold water through the jacket and coils. This method proved highly unsatisfactory. The condensed milk, when cooled in this way, was very sandy and gritty, owing to the precipitation of large crystals of sugar. Moreover, the milk adhered with great tenacity to the cold jacket and coils and could only be removed with great difficulty, resulting in much waste of time and material.

Then, some ingenious mind, ignoring the fundamental principles underlying the crystallization of sugar in saturated solutions, conceived the idea to reverse the above method. For this purpose a large cylindrical water tank was constructed. In the interior of this tank a large copper coil extended from top to bottom with an inlet at the top and an outlet at the bottom. This tank was filled with cold water and the hot condensed milk coming from the vacuum pan passed through this coil and, when it left at the bottom it was cold. This was, indeed, a clever idea, but, as a means to cool sweetened condensed milk, it was utterly worthless. The main objection to it was the fact that it caused the milk to precipitate its sugar to such an extent that the milk could not be placed on the market. Nor did it operate well, as the inside of the coil became coated rapidly with sugary milk reducing the passage until it clogged up completely.

(To be continued.)

SYNONYMY OF BEANS

By C. D. Jarvis, G.

IN the yearbook of the U. S. Department of Agriculture for the year of 1900 it is stated that American seedsmen catalogued the preceding year 815 real or nominal varieties of beans. In such a maze of names, with such looseness of nomenclatorial practice, and such inadequacy of description, growers, especially owners of private gardens, have great difficulty in securing the varieties best suited to their purposes. Anyone studying the modern seed catalogue may almost wish for the simplicity of the early days when he could number the varieties of any one vegetable on the fingers of one hand.

The list of varieties is so large that one is inclined to say at once that many of the names must be synonymous. Many of the names differ from others only in the addition of some unimportant word, such as new, select, choice, famous, etc., which undoubtedly do not mark any varietal difference. Such descriptive words as improved, stringless, rustless, early, large, and the names of persons frequently do indicate varietal differences. Examples are: Henderson Bush Lima and Improved Henderson Bush Lima, Golden Wax and Rustless Golden Wax, Refugee Wax and Stringless Refugee Wax. The indiscriminate use of such words, however, make the distinctions in varieties very confusing. The variety Red Valentine, for example, is listed under 67 different forms, a few of which follow: Early Red Valentine, Improved Early Red Valentine, Extra Early Red Valentine, Improved Extra Early Red Valentine, Improved Valentine, Round Pod Valentine, Improved Round Pod Valentine, Red Speckled Valentine, New Improved Round Pod Extra Early Red Speckled Valentine, Tait's Extra Early Valentine, Cleveland's Improved Valentine, Mammoth Stringless Valentine, Lightning Valentine.

The prefixed seedman's name often denotes superiority in stock, especially in point of purity, but the practice has been so much abused that it has little or no significance and therefore may as well be left to the reputation of the seed house.

The confusion is intensified by the practice of re-naming old varieties, examples of which are common, and the giving to new varieties names similar to names already used; for example, Stringless Green Pod, Giant Stringless Green Pod, and Grennell's Stringless Green Pod.

Occasionally an old varietal name is entirely superseded by a new one. Examples are: Golden Wax, Lightning, and Henderson Bush Lima, which were first known as York Wax, Fegee, and Dwarf Carolina respectively.

The seedsmen are not responsible for this confusion, for among them similar difficulties exist. A seedsman may secure some seed of what he believes to be an unnamed variety and, in the absence of any published descriptions of the varieties in commerce, he introduces it as a new variety. As only a few of the larger seed houses maintain trial grounds a supposed new variety is often sent out without being tested and, as a result, it often happens that the seedsman catalogues the same variety under two or more names. Seedsmen sometimes purposely list a variety under several names in order to maintain the trade in localities where a certain type is known by a local name.

It is evident from what has been said that there is a strong demand, both from the seed trade and from the public, for more precise information about varieties. This not only applies to beans but to all our garden vegetables.

During the past summer the writer tested 380 apparently different varieties of beans. The other names listed

The Cornell Countryman

J. ELIOT COIT, Editor
M. W. EVANS, - - Alumni Editor
H. E. ROSS, E. KELLY, MISS L. P. HASTINGS, - Associate Editors
M. P. JONES, - - Business Manager
J. H. BARRON, H. C. PIERCE, - Assistant Managers

JUNE, 1906

Our College Woods

JUST in the rear of the new buildings of the College of Agriculture there is a strip of woods nearly half a mile long fronting Lake Beebe. A number of men have been busy clearing out the undergrowth and preparing the ground for putting in cinder paths. Although this is a north slope, it has one of the prettiest settings of any forest ramble about Cornell, for the famous Forest Home Path traverses this same tract. This will be put in good shape and used as a picnic ground for the many school and grange picnics which will be held at the College of Agriculture.

It has been suggested that the students of the College take the responsibility of naming the various walks and seats after those persons whom the students decide that the College owes most for its existence and development. Furthermore, if certain classes wish to leave memorials it is suggested that permanent seats erected at the various good view points would be very fitting. We venture the opinion that very few, if any, colleges of agriculture in the country can boast of such a magnificent stretch of mature, natural woods as a close background to the buildings, which lying as it does along a beautiful lake makes a feature of our college in which every student should take a deep and personal pride.

CANDIDATE FOR THE DEGREE OF PH.D., 1906

MARTIN J. IORNS

Mr. Iorns was born in 1868 near Red River, La. Raised in Louisiana, Ohio, Illinois and Iowa. Was farmer, merchant, grain and stock dealer, and postmaster till 1886. Graduated from Cornell College, Mt. Vernon, Iowa, B. S. in B. C. E. in 1892. Civil Engineer C. & N. W. Railway till injured and compelled to drop that profession. Superintendent village school and later principal city high school. Instructor in Cornell College, graduate student University of Chicago in chemistry, botany, physics and geology for three years. Held Chair of Science, Fort Worth University, four years, and was also lecturer in Medical College. Entered Cornell University for graduate work in 1904. Major, horticulture; minors, physiography and soils.

CANDIDATES FOR THE DEGREE OF M. S. IN AGR., 1906

Mr. Fletcher was born in Bainbridge, N. Y., in August, 1879. He graduated at the Bainbridge High School and entered the College of Agriculture at Cornell from which he graduated in 1904. Appointed to the position of Scientific Assistant in office of the Pomologist, Bureau of Plant Industry, Washington, D. C. Mr. Fletcher has been assisting Mr. Gould, another Cornell man, in his orchard investigations in 1005-06.

WILLIAM F. FLETCHER

I. B. DEMAJUMDAR

Born in 1883 in Bengal, India. Graduated in Arts from Calcutta University, 1902. Studied at the Government Agricultural College at Libpur, was elected one of eighteen students sent to foreign countries for scientific and industrial studies. On his return to India Mr. De will direct a farm of 1,500 acres operated as a joint stock enterprise, the first enterprise of its kind in India. Mr. De is vice-president of the Cosmopolitan Club for 1906-1907.

Mr. Homer was born July 30, 1875. Was graduated from the scientific department of the State Agricultural College of Utah in 1900. After graduation Mr. Homer spent one year teaching in the Oneida Academy, Idaho. The following three years were spent in travel and study in Europe. In the fall of 1905 Mr. Homer resigned his position as Instructor in Agriculture at the L. D. S. University of Salt Lake City, Utah, to take up graduate work in the department of horticulture at Cornell University. Next year Mr. Homer will be at the head of the horticultural department of the Brigham Young University of Provo, Utah.

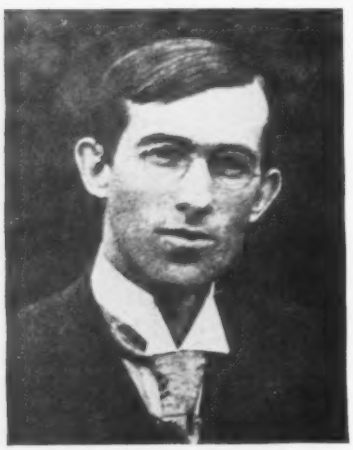
WILLIAM H. HOMER

J. C. HOGENSON

Born in 1874; raised on a farm; received the degree of B. S. from the Agricultural College of Utah in 1899. Taught school three years. Graduate student Michigan Agricultural College in 1902. Employed in the Bureau of Soils, U. S. Dept. of Agr. three years as Soil Expert. In the fall of 1905 he resigned his position with Bureau of Soils and took up graduate work in horticulture and agronomy at Cornell University. Mr. Hogenson married Miss Lydia Baker in 1903; they have one child.

Mr. Howitt was born in 1881 at Guelph, Ontario. After attending the Guelph High School, he spent a year on a farm before entering the Ontario Agricultural College at Guelph. He graduated in 1905 and entered Cornell. In the summer school he specialized in entomology. He aided in the orchard survey work in Niaraga County, N. Y. Major, horticulture; minor, entomology. Member of Lazy Club and Sigma Xi.

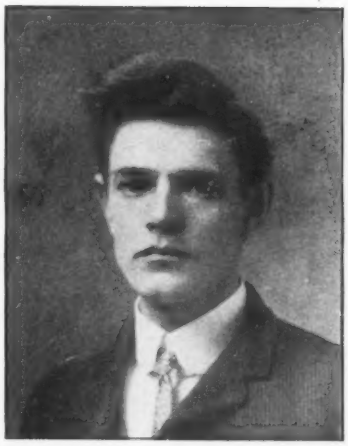
J. E. HOWITT



CLAUDE I. LEWIS

Mr. Lewis was graduated from the Massachusetts Agricultural College in 1902. In 1903 he was Master of Science at the Rockland High School at Rockland, Mass. During the years 1903-1905 he was head of the Dept. of Nat. History and Agriculture at Alfred University. He entered Cornell as a graduate student in horticulture and landscape gardening in the fall of 1905. He has accepted the position of Professor of Horticulture at the Oregon State College of Agriculture. Mr. Lewis is married and has one child.

Mr. Swaine was graduated from Yarmouth Academy, Yarmouth, N. S., and later from the Provincial Normal School of Truro, N. S. After teaching for two years at Ohio, N. S., he entered the Truro School of Agriculture from which he was graduated. For two years he was principal of St. Ninian High School, Antigouish, N .S. Graduated B. S. in Agr. from Cornell, 1905. Sigma Xi.



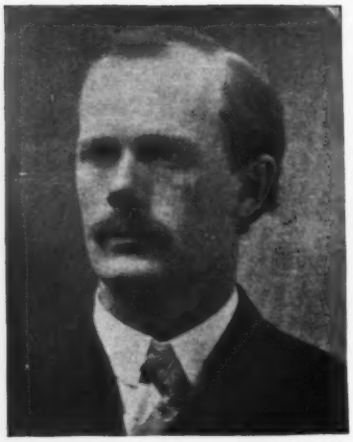
JAMES MALCOLM SWAINE

A. D. TAYLOR

Born in Carlisle, Mass., on July 8, 1883. Obtained his secondary education in Westford Academy. Entered the Massachusetts Agricultural College in the fall of 1901 and received the degree of B. S. in June, 1905, and also obtained the same degree from Boston University. Was elected a member of the society Phi Kappa Phi in June, 1904. While at Cornell Mr. Taylor has been on the instructing staff of the Outdoor Art Department and intends to make landscape gardening his profession.

Mr. Tan was born in Canton, China, in 1878. He graduated from the mining college of Tientsin University in 1899, after which he entered upon his duties as an assistant engineer of an iron mine in Hu Peh. Later he became interested in Agriculture, came to America in 1901, and entered the University of California, from which he received the degree of B. S. in Agriculture in 1904. He entered Cornell University in February, 1905, specializing in agricultural chemistry and agronomy. Mr. Tan is the first Chinese student to graduate from an agricultural college of an American University.

TIEN CHIH TAN



PAUL J. WHITE

Mr. White was born in Moravia, N. Y., but soon moved to a farm in Kansas. He attended the Southwest Kansas College, receiving the degree A. B. in 1900. The next two years he spent at the University of Oklahoma as an assistant in botany, taking the degree A. M. in 1901. During the summers 1900 and 1901 he was engaged in a geological and natural history survey for that university. In 1904 he studied agriculture at Harvard where he was an assistant in the chemical laboratory. In the fall of 1905 he entered Cornell as a graduate student in Agronomy.

MISS LAURA GANO

Miss Gano is a native of Ohio. She is a graduate of Earlham College, Richmond, Indiana, and a graduate in science of the University of Chicago. She has been a teacher of Natural Science and Nature Study in the schools of Cincinnati, Ohio, and has also taught in the Earlham College Summer School.

Miss Gano is interested in practical farming and country life.

CANDIDATES FOR THE DEGREE OF B. S. IN AGR., 1906

JOHN H. BARRON

Mr. Barron was born in June, 1883, near Nunda, N. Y. He early went to live on a farm where he acquired a taste for things agricultural. When a small boy he went to district school and later to Nunda High School from which he graduated in 1900. He entered Cornell with the class of 1906, and has been on the *Countryman* Board for two years. Sigma Xi in 1906. Cayuga Club. During his college course he has specialized in soils, agronomy and horticulture.

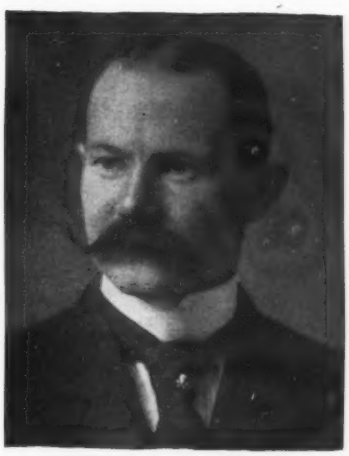
Born in 1885 at Dover, N. H. Prepared for college at the Dover High School and entered the New Hampshire State College of Agriculture in the fall of 1901. After completing his sophomore year, he entered Cornell in the fall of 1903 with the class of 1906. He has specialized in horticulture and botany and intends to follow this line of work. Member of Cayuga Club and of the Granite Chapter of Alpha Zeta.

WILFRID GORDON BRIERLEY

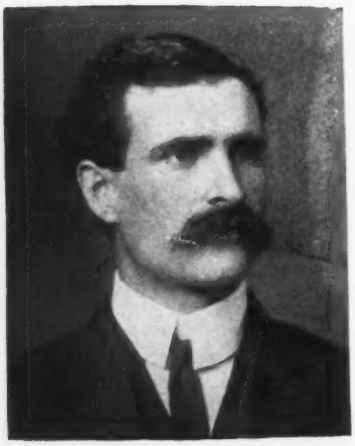
HORACE E BRINCKERHOFF

Mr. Brinckerhoff was born in Mt. Vernon, N. Y., in 1884. After graduating from the Grammar and High Schools he entered Cornell in the fall of 1902. Entered College of Forestry but when that course was discontinued entered the College of Agriculture. Mr. Brinckerhoff has specialized in Outdoor Art. Captain Varsity Basketball team in Junior year. Member of Delta Tau Delta fraternity.

Mr. Bues was born in Achim, Germany, in 1874. He attended the Real Gymnasium, Bremen. Cornell Winter Course, 1902, and later entered class of 1906. During vacations has been employed as State Nursery Inspector of Wisconsin. After graduation he will go to Peru, South America, to aid in the development of large tracts of land. Mr. Bues identified himself with the foundation of the Cosmopolitan Club, *Cornell Countryman*, N. Y. State Experimenter's League, and Traveling Summer School of Agriculture. Alpha Zeta, Sigma Xi, Cosmopolitan Club.



CHRISTIAN R. A. BUES



H. F. BUTTON

Mr. Coelho was born in Sao Paulo, Brazil, 1882, where he studied at Mackenzie College.

For three years he managed his father's coffee-plantaion at Jahu, then studied law for a time. In 1903 he entered Cornell. After Commencement Mr. Coelho intends to go to Europe for a few months before returning to Brazil to take charge of his father's business where he will put his Cornell experiences into practical use.

Mr. Coelho is a member of the Cosmopolitan Club.

A. A. D. DURWARD

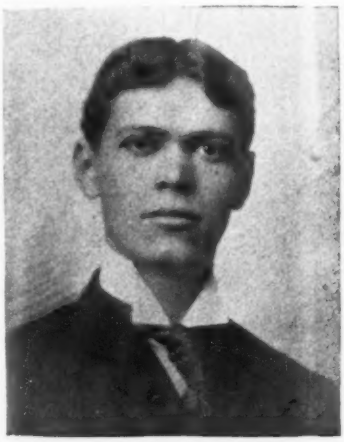
Mr. Button was born on a farm near Canastota, N. Y., in 1879. He came to Cornell as a Winter Course student in 1901. Returning as a special he worked off his conditions and became regular. He has devoted much of his time to animal husbandry and is an expert judge of dairy cattle, swine and poultry. He has done some work in the Home Nature Study department and is a lecturer at Farmer's Institutes. After graduation Mr. Button will hold the position of Supt. of the estate of Mr. G. E. Tarbell.

A. S. COELHO

Born in Scotland in 1881; came to this country in 1887; obtained his early and high school education at Claremont, New Hampshire. Was graduated from Stevens High School in 1900. After working on his father's farm one year, he spent two years at N. H. State Agricultural College, and then entered Cornell and has specialized mostly in horticulture. Member of C. U. lacrosse team, Agr. Col. baseball team, Lazy Club, Agr. Association, Cayuga Club, and Granite Chapter of Alpha Zeta.

Mr. Evans was born at Neath, Bradford County, Pennsylvania. After attending the district school in that place, he studied for two years at the Susquehanna Collegiate Institute, Towanda, Pa., and later graduated from the Towanda High School. Taught school one year. At Cornell he has taken a general agricultural course, taking considerable work in botany, soils and agronomy. He has been on the *Cornell Countryman* two years; is a member of the Cayuga Club.

M. W. EVANS



LUPERCIO FAGUNDES

Mr. Fagundes was born at Sao Paulo, Brazil. Prepared at Mackenzie College in Sao Paulo and entered Cornell in 1901. In the summer of 1904 he went to Brazil and remained there the rest of the year. In 1902 he was an active member of the Cornell Fencing club and won the 2nd Amster medal. He finished his college work in the fall of 1905 and is now traveling in Europe. He intends to return to Brazil and take charge of his several coffee plantations. Member of Cosmopolitan Club.

Mr. Fagundes was born in 1881 at Sao Paulo, Brazil. After he had finished his preparatory work at Mackenzie College, Sao Paulo, he managed his father's coffee plantation at Riberias Preto. In the fall of 1902 he came to Cornell. After June, Mr. Fagundes intends to spend some months in the South investigating Southern agriculture before returning to Brazil to take charge of his father's business.

WALDOMIRO FAGUNDES

S. M. HERRICK

Mr. Herrick was born in New England but has spent the most of his life in the Southern States. He came to Cornell University to specialize in agricultural chemistry and expects to be located in Cuba after graduation.

Mr. Holton prepared for college at the Montclair High School, Montclair, New Jersey, and entered the Agricultural College at Cornell in 1902. Mr. Holton has specialized in chemistry and dairying and when through college expects to go into business.

EDWARD N. HOLTON

L. W. JOHNSON

Mr. Johnson was born at Youngstown ,N. Y., in 1881. He attended grammar school and Masten Park High School in Buffalo. Entered Cornell in 1902 and took work in forestry, but later, after that college had been discontinued entered the College of Agriculture to specialize in horticulture. Elected manager of basketball team 1905. Varsity lacrosse team two years but won his numerals in the Junior class crew. Kappa Sigma, Scalp and Blade, and Gemel Carm.

Mr. Johnston expects to enter the Government Service.

Ora Lee, Jr., after preparing for college at his home town High School, at Albion, N. Y., entered the Agricultural College in 1902. He has taken a general course, specializing in his senior year in soils and agronomy. In April, 1906, he received an appointment in the Bureau of Soils of the United States Department of Agriculture. He was business manager of the *Cornell Countryman* in 1905-06.

ORA LEE, JR.

L. I. LIBBY

Mr. Libby was born in Province of Quebec, Canada in 1882. He came to the United States in 1894. In 1900 he was graduated from Worcester, E. H. S. He entered Cornell Agricultural College in 1902.

P. L. Lyford was born at Waverly, N. Y., August 7, 1884. After preparing for college at the Waverly High School he entered the College of Forestry at Cornell in 1902. As the Course in Forestry was discontinued the following year, Mr. Lyford entered the Agricultural College in 1903 and has specialized in landscape design. Member of Basketball team '02-'05 and captain '05-'06. Member of senior ball committee and Sigma Alpha Epsilon.

P. L. LYFORD

CHARLES W. MANN

Charles W. Mann was born at Hawkins, Allegheny Co., Pa., on Jan. 4, 1879. He was educated at the common and high schools of Pittsburg. After working four years at civil engineering he entered the Western University of Pennsylvania to study the same and then took his Sophomore year in the civil engineering course at Cornell. He has taken his last two years in agriculture and expects to enter the Bureau of Soils.

R. MATHEWSON

Mr. Mathewson was born in Picton County, Nova Scotia, Canada. He received his primary education in the schools and academy of that province, and later attended the school of Agriculture at Truro. Mr. Mathewson is specializing in entomology.

E. O. DE ZEVALLOS

Mr. Zevallos was born in Paris in 1885, and moved to his home in Peru in 1894. He prepared for college at the "Institute de Lima" and also spent one term at the National School of Agriculture at Lima. He entered the Cornell Agricultural College with the class of 1906, and has specialized in agronomy. Before returning home Mr. Zevallos intends to travel in the South in order to become acquainted with the agricultural conditions there.

Mr. Peck was born in New Brunswick, Canada, near the head waters of the Bay of Fundy. Later his family moved to Wolfville, Nova Scotia, where his home now is. He prepared at Mt. Hermon Boys' School, Mass.; entered Cornell as special student in Agriculture in fall of 1902. He intends to remain at Cornell another year, continuing his studies along a special line.

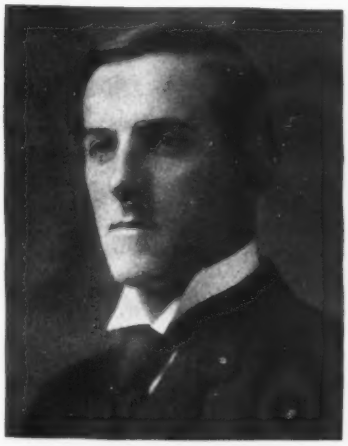
F. E. PECK

HAROLD E. ROSS

Mr. Ross was born at Leadville, Colorado in 1881. Since 1883 he has lived on a farm in Southern New York. He prepared for college at the Waverly High School from which he graduated in 1902, and in the fall of the same year entered the Agricultural Course at Cornell, with the class of 1906. Mr. Ross has specialized in dairying, and was student assistant in the dairy laboratory during the short Winter Course of 1906.

When through college he intends to take up some branch of dairying as his life work.

Mr. Shaw was born on a farm in West Henrietta, N. Y., in 1881. He graduated from Starkey Seminary in 1902 and entered Cornell the succeeding fall. He specialized in soils, agronomy and dairying. Was assistant in soils in Junior and Senior years. In February, 1906, Mr. Shaw accepted an appointment as scientific assistant in the Bureau of Soils, U. S. Department of Agriculture. Mr. Shaw hopes to take up farming on his own account after a few years of soils work.



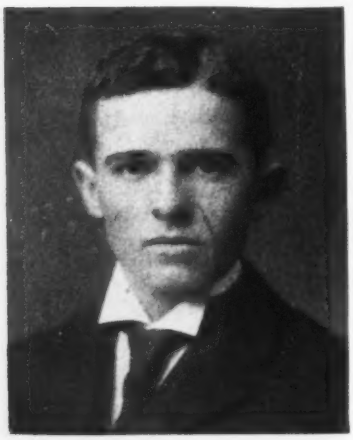
CHARLES F. SHAW

R. R. SLOCUM

Mr. Slocum was born at King Ferry, N. Y., in 1883. His home has been in Ithaca since early childhood. He entered Cornell with the class of 1906 and chose the Forestry Course. When this course was discontinued he tried Arts for one year and then changed to Agriculture. He has specialized in poultry husbandry and expects to make that his life work.

Mr. Swiggett was born in 1881 at Morrow, Ohio. He graduated from the Woodward High School, Cincinnati, Ohio, in 1902. Mr. Swiggett entered Cornell with the class of 1906 and has specialized in landscape gardening and horticulture.

EDWARD M. SWIGGETT



GEORGE W. TAILBY, JR.

Mr. Tailby, Jr., was born in Ithaca, N. Y., and prepared for college in the Ithaca High School. He entered Cornell in the fall of 1902. After completing his work for graduation, he left April 1, 1906, and has since been employed by the U. S. Bureau of Soils as field assistant on the Soil Survey.

Mr. Tibirica was born in Sao Paulo, Brazil, in 1882 and took a preparatory course at Mackenzie College. After studying agriculture for one year at Escola Polytechnica Mr. Tibirica returned to Mackenzie College and prepared for Cornell, which he entered with the class of 1906. He has devoted himself to the study of malt and hop products which he will continue in Europe. After his studies are completed Mr. Tibirica intends to return to Brazil and manage his father's coffee plantation. He is a member of the Cosmopolitan Club.

JOAO TIBIRICA

HARVEY L. WESTOVER

Mr. Westover was born at Austerlitz, N. Y., in 1879. After graduating from the Chatham High School, he taught in the district schools for a few years. In the fall of 1902 he entered Cornell as a special student in agriculture and the next year entered the regular course. He has specialized in chemistry and soils.

(Continued from page 219)

by seedsmen were known to be synonymous and were not tested. Of the number tested 196 proved to be distinct sorts. One important lesson learned from this work is found in the fact that many of the synonyms under certain conditions may possess economic characters, such as vigor, productiveness, disease resistance, etc., which are not found in the original type. As a rule, however, synonymous forms are identical in every way. We apparently, then, have two kinds of synonyms; those which have been produced by the re-naming of a variety or what we may call a true synonym, and those which have been originated independently or have been modified by environment, selection, or other influences. The characters of the latter kind are not always manifest, but are apparently latent and are likely to become apparent when conditions are favorable. In variety tests no distinction is made in these two kinds of synonyms . The determination of these latent characters must be left to the individual grower.

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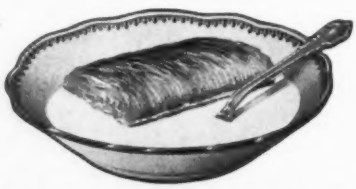

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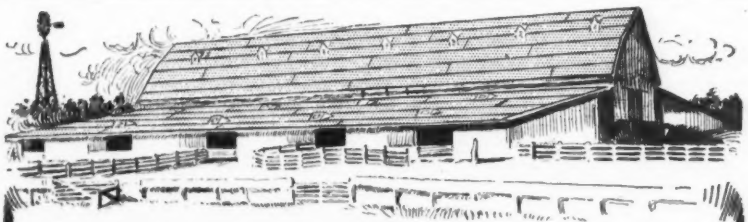

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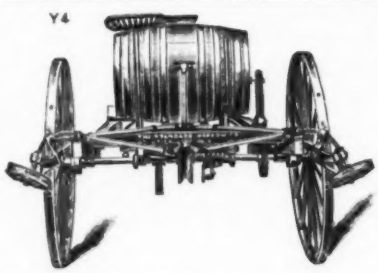

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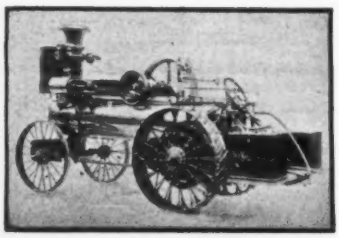

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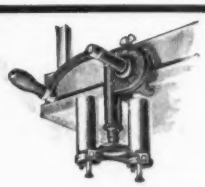

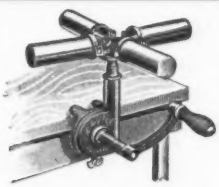

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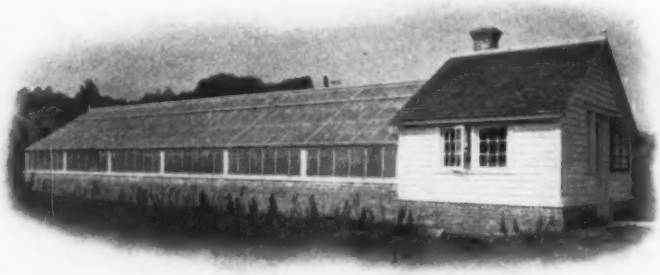

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